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Student Medicine

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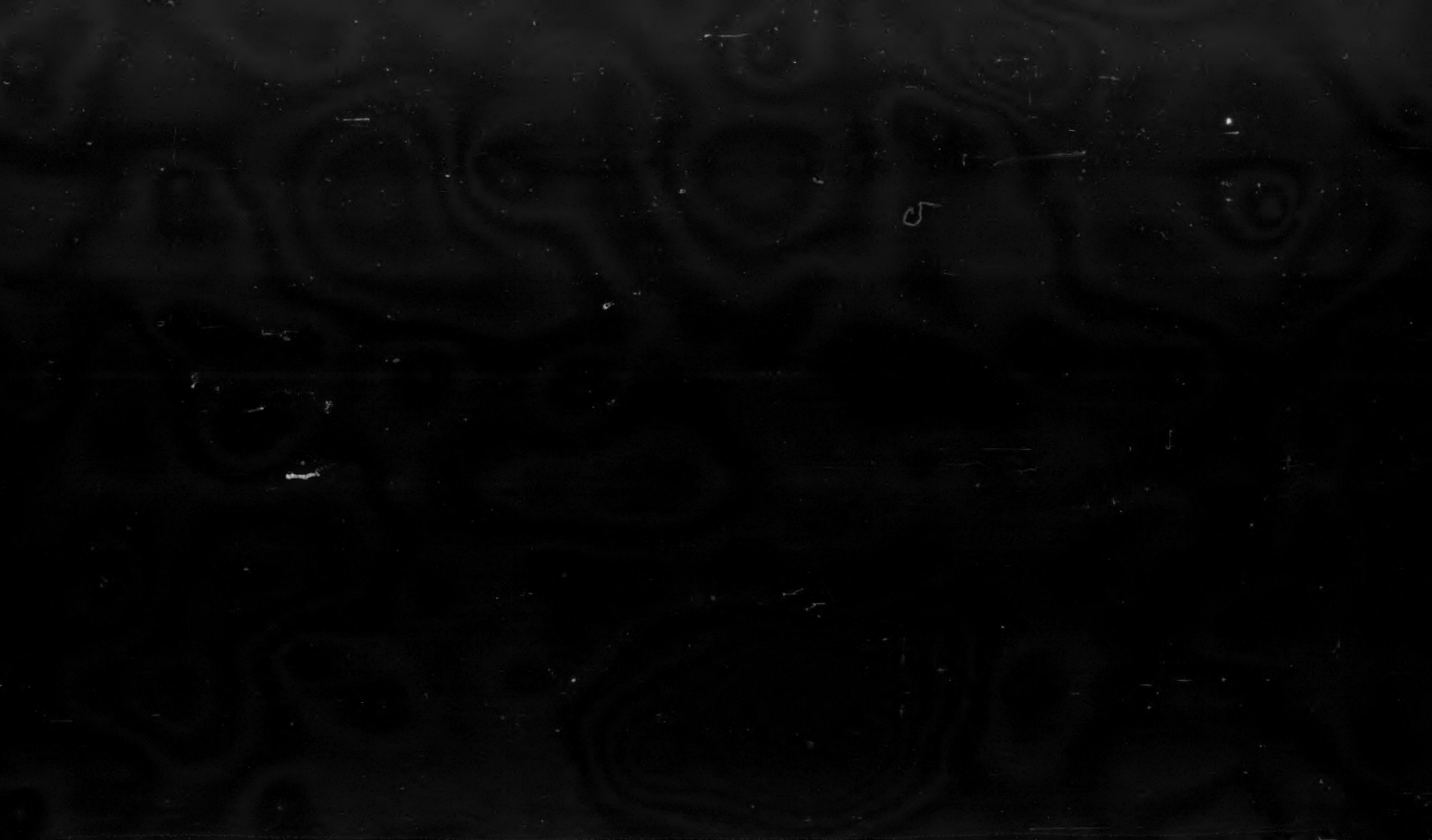

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Editorial Comment

EDUCATION AND EMOTIONAL HANDICAP

THE ANALYSIS of twelve months' experience with psychosis as presented in the Case Reports of the Cornell University Infirmary and Clinic in this issue raises some questions.

In times long past, physical illness was thought by many to be a punishment for some kind of sin or evil. In recent years emotional illness has been slowly emerging from an atmosphere of personal and family disgrace and is now accepted for what it really is, an emotional handicap of varying degrees of importance.

Hence, it follows that new criteria for dealing with the recovered or improved "mental" patient in our society must be found and used. We now know something about "why" mental illness occurs, and we know something about what happens during recovery. Although this is a small beginning, it stands in sharp contrast to the rigid descriptive and static concepts of previous psychiatric practice. These new criteria will be relevant to decisions concerning the activities of formerly psychotic people, be they college students, chauffeurs, school teachers, military personnel, or others.

A psychotic reaction per se in a student's past should not automatically or categorically bar him from pursuing his education at the advanced level, or from transferring his residence from one seat of learning to another. The degree of recovery, the tenacity of the underlying pathological process, the capacity to live comfortably with one's neighbors, the ability to profit from one's educational experience and to make a contribution to society, these are the areas in which criteria for college attendance must be devised.

Further research and further analysis of the problem are needed, one result of which will assure individuals that having once had a mental handicap will not *necessarily* be regarded as a permanent barrier to opportunity to fruitful living and working.

C.D.D.

THE VALUE OF RECORDS

In these pages of the previous issue of *Student Medicine* we made a plea for the keeping of statistical records in student health services and urged the development and adoption of a standardized annual report form for use by student health services throughout the country. The paper written by Florence DeRemer describing a fourteen years' experience with the food services of a university infirmary urges us to emphasize again that substantial benefits might be derived from such action.

It is possible to evaluate the efficiency of such an operation only if adequate records have been kept. From no other sources can the faults or successes be fully ascertained, nor can the way be pointed to effect improvement. This paper by Miss DeRemer illustrates the value of well-kept records. While it is obvious even without recourse to records that the cost of serving meals has gone up in the past fourteen years, it undoubtedly came as a surprise even to those closely associated with the management of the food service to find the increase was divided so unequally between the cost components. Records made possible the recognition of the factors needing more study and indicate where there may be need for modification of present modes of operation.

Just as important as the keeping of records is the using of them. Records kept and filed away without further reference to them are worse than useless, for they represent wasted work and wasted opportunity. Let us keep records and let us use them.

IMMUNIZATION AGAINST TETANUS

The prevention of tetanus is a frequently recurring problem in student medical practice, as it is, indeed, in most types of medical practice. The dangers inherent in the use of antitoxin are real and ever-present, ranging from urticaria, to serum sickness, to fatal anaphylactic shock. Even the greatest of care in testing for sensitivity and in administering the antitoxin in divided doses when so indcated cannot prevent these dreaded reactions.

The risk of acquiring tetanus is far greater in this country than is the risk of contracting smallpox. In New York State during the year

1948–1953 there were an average of twenty-seven cases of tetanus with an average of six fatalities each year. Yet there seems to be no concerted action to provide for the protection of all individuals against tetanus. There is available an agent for preventing tetanus whose effectiveness has been said to be "as nearly perfect as anything biological can be."[1] The author is referring to active immunization against tetanus by means of tetanus toxoid, and he cites evidence showing that its effectiveness was proven beyond doubt by the experience of the United States Army during World War II.

Here, then, is a proven immunization procedure which is not being as widely used as it undoubtedly should be, either in the general population or in the student population of colleges and universities. In a recent survey of the health services in American institutions of higher learning Moore and Summerskill found that only about 11 per cent of such schools require immunization of students against tetanus.[2]

That such an immunization program is practical has been proven by the experience at Cornell University which is described in this issue by Dr. Henry B. Wightman. This program has been characterized by good student acceptance and by freedom from disturbingly frequent or severe reactions. The benefit most appreciated by members of the medical staff has been the virtual elimination of the problems arising from the use of tetanus antitoxin. These problems now arise in only an occasional case, when a student is injured before the immunization procedure has been completed.

Are not the student health departments of those schools which have no such program missing a valuable opportunity, not only to protect their students but also to educate them as to the value of such a procedure? After graduation these students often become leaders in their communities and as such will help to shape the health attitudes and policies of local health agencies. This might help to bring nearer the time when all people may be assured of safe protection against tetanus. College and university health services might well point the way.

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[1] E. S. Stafford, T. B. Turner, and L. Goldman, On the Permanence of Anti-Tetanus Immunization, *Ann. of Surg., 140*:563–568, 1954.

[2] N. S. Moore and J. Summerskill, *Health Services in American Colleges and Universities, 1953* (Ithaca, N.Y.: Cornell University, 1954).

THE GANNETT MEDICAL CLINIC

On February 2, 1955, the Gannett Newspaper Foundation announced the gift to Cornell University of a student medical clinic to honor Frank E. Gannett, a Cornell graduate of the Class of 1898 and a trustee of the University since 1926.

With this gift the Foundation pays tribute to the long interest that Mr. Gannett has had in student health matters. For over ten years he has supported a campus diet table for Cornell students who have unusual nutritional problems.

This project will fill a long-standing need for a permanent clinic building centrally located on the Cornell campus. It will handsomely complement the present 125-bed student hospital made possible in part by another distinguished trustee, Henry W. Sage.

As the announcement noted, "The building is envisioned as a model clinic which will embody ideas gained from Cornell's fifteen years of clinic operation. . . . This building assures to future Cornell students the finest possible health service and protection."

We hope that progress made and innovations introduced because of these fine new facilities will be a subject of reports in this journal in the years ahead.

The Program of Tetanus Immunization at Cornell University

HENRY B. WIGHTMAN, M.D., CORNELL UNIVERSITY

THE problem of protecting students against tetanus is often encountered in a student health service. Abrasions, lacerations, penetrating wounds, and compound fractures are accidents frequently encountered because of the active life of college students. To protect students thus exposed to the risk of tetanus and yet to avoid reactions which frequently follow the use of antitoxin led Cornell University in 1942 to require all entering underclassmen to be actively immunized against tetanus by means of tetanus toxoid. Tetanus immunization thus joined smallpox vaccination and x-ray examination of the chest as a health requirement for students entering Cornell University.*

Tetanus was described by Hippocrates, but its nature remained obscure until the late nineteenth century, when the tetanus bacillus was isolated and its toxin identified. This was soon followed by the development of an antitoxin which was demonstrated to be capable of preventing the disease in experimental animals by uniting with and thus neutralizing the toxin before it reached the nervous system. This work was soon applied to the prevention of tetanus in humans. Antitoxin was produced in quantity from the serum of horses that had been injected with tetanus toxin or toxin-antitoxin mixtures, the latter proving more effective. The first extensive use of antitoxin was during World War I, when the British Army began, in October 1914, to give all wounded soldiers 500 units of tetanus antitoxin. Within a

* We are indebted to the Lederle Laboratory Division of the American Cyanamide Company for providing the tetanus toxoid during the period herein described.

few months the incidence of tetanus fell from 31.8 per thousand wounded to 1.7 per thousand. It has been questioned, however, whether tetanus antitoxin should receive all the credit for this, because more extensive debridement of wounds and more understanding surgical care began to be utilized at about the same time.

Turner, Stafford and Goldman recently surveyed the records of sixteen hospitals in the Baltimore area and found 169 cases of tetanus recorded in the last twenty-five years.[1] There were 142 cases which had not received tetanus antitoxin prophylactically following injury; of these seventy-two, or 50 per cent, ended fatally. Twenty-five cases had been given 1,500 units of tetanus antitoxin following injury, and of these thirteen, or 52 per cent, died. These figures indicate that prophylactic use of tetanus antitoxin is not a guarantee against contacting the disease or even dying from it.

After the development of antitoxin, investigative work continued in an effort to find a means of producing active immunity against tetanus such as had been done in the case of diphtheria. Descambey in 1924 showed that a bacterial toxin treated with formaldehyde was deprived of most of its injurious qualities but retained its antigenic properties. Toxin so treated was termed toxoid. With this work as a basis, Ramon in 1925 first used tetanus toxoid to produce active immunity. Various modifications in the preparation of tetanus toxoid have resulted in products which require fewer injections to produce immunity and whose use is followed by remarkably few reactions.

The effectiveness of tetanus toxoid was well demonstrated during World War II in the United States Army. On induction each soldier received basic immunization, consisting of three injections of fluid toxoid, or two injections of alum precipitated toxoid, one month apart, followed by a booster dose one year later. Another booster dose was given immediately following injury. Of 2,739,819 hospital admissions for wounds and injuries, only twelve cases of tetanus developed, according to Long and Sartwell.[2] Of these twelve, only four had completed the basic course of immunization, and of these four

[1] E. S. Stafford, T. B. Turner, and L. Goldman, On the Performance of Anti-Tetanus Immunization, *Ann. of Surg., 140:*563-568, 1954.

[2] A. P. Long and P. E. Sartwell, Tetanus in the United States Army in World War II, *Bull. U.S. Army Med. Dept., 7:*371, 1947.

only one died. This record is even more remarkable when one considers that many more minor injuries were treated without hospitalization.

The development of a means for producing active immunity to tetanus is welcome because of the frequent reactions to tetanus antitoxin, which is prepared from horse serum. Anaphylactic reactions, urticaria, serum sickness, and possibly some of the collagen diseases—such as periarteritis nodosa—may follow the use of antitoxin in patients who prove sensitive to horse serum. Such reactions are more frequently encountered in those patients who have other manifestations of allergy, or about 10 per cent of the general population. All people should be tested for sensitivity to horse serum before the prophylactic dose of antitoxin is given; if sensitivity is exhibited, the decision must be made whether to omit the antitoxin or to give it in divided amounts. All this is time consuming and does not necessarily prevent a reaction even if the antitoxin is given in divided or desensitizing doses. These problems can be largely eliminated in student medicine by a program requiring active immunization of all students.

Such a program has been in effect at Cornell University for the past twelve years. The program has consisted of a series of two injections of toxoid a month apart during the first year and a third injection one year later. This is considered to provide basic immunization. Subsequent to this a booster dose of toxoid is administered in case of injury and every four years if a student remains that long on campus. At first, the alum precipitated toxoid was used. Later it was supplanted by the aluminum phosphate adsorbed form, which produces fewer reactions.

The physical problems involved in giving injections to 2,000 or more students are not inconsiderable. If this many students are to be injected at one time, a large room is required, providing enough space for four teams of doctors, nurses, and clerks and for the accommodation of the students awaiting their turn. Appointments are arranged in advance, with notification of the students by means of postcards, so that 200 to 250 students arrive every fifteen minutes. A clerk records each student's name, a doctor gives the injection of toxoid, a nurse changes needles and fills syringes, and other nurses sterilize supplies and assist as needed. With this type of setup, four

teams can take care of as many as 2,000 students in about two hours. With proper spacing of appointments and efficient management, students do not have to wait more than a few minutes. This is important, for it helps to secure student co-operation when the additional injections, needed to complete the basic immunization, are given. Student co-operation and acceptance have been good, although there are always some few students who fail to keep their appointments. Special appointments at a later date take care of most of these. Since tetanus immunization is required, students who do not complete or arrange to complete their scheduled immunization procedures by the end of the first semester are not permitted to register for the next semester until they comply.

The preferred time to start the immunization series is in September, immediately following registration of entering students. However, because of evidence that poliomyelitis is more likely to affect a limb that has recently been the site of an injection, the start of immunization is delayed until the health authorities believe that the poliomyelitis season is past.

The number of students experiencing significant reactions is surprisingly small. Many have a little soreness at the site of injection or a small lump, which soon loses its tenderness even though the lump may persist for several weeks before disappearing. A few, less than one per cent, develop a red, hot, swollen area about the site of injection several days to a week later. This lasts only a few days, and discomfort is relieved by rest and analgesics such as aspirin. A very few develop fever, headache, and malaise of such degree as to make hospitalization desirable. In the past eight years, during which over 16,000 students have been immunized, only eight such cases have been admitted to the Infirmary. This probably represents no more than one such case for every 6,000 injections, for numerous booster injections have been given in addition to the basic three per student.

In recent years an increasing number of students have received tetanus toxoid before coming to the university, either because of previous military service or because they were immunized in childhood. In the late 1930's pediatricians, family doctors, and health departments began using tetanus toxoid in combination with diphtheria toxoid and pertussis vaccine in the basic immunization program for infants

and children. Veterans are assumed to have been immunized without further proof, but others must submit a statement from their physician giving the dates of previous injection and of the last booster dose, if any. Such a statement satisfies the requirement. The only concern of the medical department in these cases is to provide for maintenance of immunity by properly spaced booster doses.

Several questions may be raised concerning the use of tetanus toxoid. How effective is the resulting immunity? Does a booster dose of toxoid produce an effective level of antibody? What is the optimum interval between booster doses, and what is the maximum time which may elapse and the booster dose still be effective? How long does it take after a booster for an antibody response to develop? These questions will be considered in order and an attempt made to answer them on the basis of present information.

The evidence for effectiveness of the immunity produced by tetanus toxoid, as judged by clinical experience in the United States Army during World War II, has already been cited. Another approach in measuring its effectiveness has been the determination of the serum antibody levels in individuals who have been immunized. It has been generally accepted since World War I that a serum antitoxin level of 0.1 unit per milliliter constitutes a protective amount. Turner, Stafford, and Goldman determined antitoxin levels in the serum of 175 individuals.[8] These subjects could be divided into three groups, those who had never received tetanus toxoid, those previously immunized but whose last injection of toxoid had been at least five years ago, and a third group who had been immunized and had received toxoid within the past five years. As expected, those who had never received toxoid had no detectable serum antitoxin. In those whose last previous injection of tetanus toxoid had been from five to eleven years before, some antitoxin was demonstrable, and in forty-five of the seventy-two individuals in this group the level was 0.1 unit per milliliter or more. Those who had received toxoid within five years showed, on the average, considerably higher levels, and sixty-four of seventy-three had levels of at least 0.1 unit per milliliter.

[8] T. B. Turner, E. S. Stafford, and L. Goldman, Studies on the Duration of Protection Afforded by Active Immunization against Tetanus, *Bull. Johns Hopkins Hosp., 94*:204, 1954.

These results seem to indicate that protective levels of antibodies persist for more than five years and, in fact, in some individuals for as long as eleven years following tetanus immunization.

Some individuals in each of these groups were given a booster dose of 0.5 cc. of tetanus toxoid. In those not previously immunized no antitoxin was found fourteen days later, while in fifty-three individuals immunized five to eleven years previously, there was a marked rise in antibody titer beginning about the fourth or fifth day. By the seventh day all but two had levels above 0.1 unit per milliliter, and by the fourteenth day all had levels above 1.0 unit, with all but two above 10 units per milliliter. In those whose last injection of toxoid had been within five years the rise was prompt and comparable to that just described. In previously immunized individuals a booster dose of tetanus toxoid will result in a level of antitoxin which equals or exceeds that which is considered to be protective. In an occasional individual this level is not reached until between the seventh and fourteenth days.

Turner *et al.*, after discussing the above-noted findings, concluded that tetanus toxoid booster injections at five-year intervals are adequate, and they observe that even at ten-year intervals boosters may be adequate for the majority of individuals. The four-year interval between boosters, decided on some years ago at Cornell, then appears to be a safe one.

Evidence already described indicates that significant rises in antibody occur in four to seven days following a stimulating dose. A similar delay in reaching maximum antibody level has also been shown following the administration of 1,500 units of tetanus antitoxin, peak levels being reached in about four days with a fairly rapid decline thereafter. After toxoid injection the high antibody level persists for a long period.

SUMMARY

A program for immunizing all undergraduate students in a university has been described. This program begins soon after the student enters the university and consists of two injections of 0.5 cc. aluminum phosphate adsorbed tetanus toxoid spaced one month

apart; this is followed by a third injection one year later. Thereafter, stimulating doses are given whenever indicated because of injury and at four-year intervals in those students who remain on campus for that long. Reactions to tetanus toxoid have not been numerous and for the most part have been mild in nature. Evidence from the literature is cited indicating that such a program of active immunization may be expected to provide adequate protection against tetanus.

Prophylaxis against Rheumatic Fever Recurrences in College Students

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THE individual who has suffered from rheumatic fever in the past faces grave danger if the fever recurs. Death may occur during acute rheumatic fever, or the resultant valvular damage might shorten longevity. The prevention of recurrences by regular prophylactic doses of penicillin is now established as effective.[1]

What responsibility, then, does the college physician have to the student coming under his supervision with a past history of rheumatic fever or the physical signs of rheumatic heart disease? He may find in the medical literature no specific recommendations to guide him in the individual case. Fundamentally he must assess the risks involved and then decide what prophylaxis, if any, is desirable. This paper considers some of the factors involved, with the hope of aiding each college health department to establish its own most reasonable program.

The rationale of prophylaxis lies in the established concept that the etiology of rheumatic fever is intimately associated with prior infection by group A streptococci.[2] The incidence of rheumatic fever rises in an epidemic of streptococcal disease. The individual with rheumatic fever usually gives a history of recent sore throat or febrile illness. The immunological tests which indicate recent streptococcal

[1] B. F. Massell, Present Status of Penicillin Prophylaxis of Rheumatic Fever, *Modern Concepts of Cardiovasc. Dis., 20:* 108, 1951.
[2] H. F. Swift, The Etiology of Rheumatic Fever, *Ann. Int. Med., 31:* 715, 1949.

infections (of which the most useful is the antistreptolysin titer[3]) showed significantly elevated findings in most patients with rheumatic fever. Indeed, recent work by Rammelkamp and his co-workers suggests that a continuing infection or carrier state may be necessary for the production of rheumatic fever.[4]

Recurrences of rheumatic fever occur most often in young people and within five years of the last attack. In the classic study of Bland and Jones, conducted on 1,000 young rheumatic fever patients before the antibiotic era, 23 per cent of the living patients suffered from attacks of rheumatic activity or chorea during the second and third years of observation, and it was not until the ninth year that the incidence of recurrence dropped below 9 per cent.[5] The recommendation of the American Heart Association, therefore, has been that any patient who has suffered from rheumatic fever should remain on prophylactic therapy for life.[6]

One might advance the following argument against prophylaxis: since adequate pencillin therapy of streptococcal infections prevents consequent rheumatic fever in most cases, such treatment should be sufficient and prophylaxis on a regular basis unnecessary. The rebuttal to this argument includes three major points. First, an occasional recurrence of rheumatic activity will occur despite adequate treatment of streptococcal infection. Second, even by assuming the streptococcal etiology of all sore throats and febrile illnesses and treating them with penicillin, the physician may be unable to recognize some streptococcal disease and therefore will not treat it with penicillin. Third, the importance of "low grade" infections, carrier states, and such unrecognized infections of the human body by streptococci remains unevaluated. In the Bland-Jones study, 44 per cent of those who had no demonstrable heart disease at the end of their initial attack of rheumatic fever had developed signs of rheumatic

[3] H. F. Wood and M. McCarty, Laboratory Aids in the Diagnosis of Rheumatic Fever and in Evaluation of Disease Activity, *Am. J. Med., 17:* 768, 1954.

[4] F. J. Catanzaro, *et al.,* The Role of the Streptococcus in the Pathogenesis of Rheumatic Fever, *Am. J. Med., 17:* 749, 1954.

[5] E. F. Bland and T. D. Jones, Rheumatic Fever and Rheumatic Heart Disease; A Twenty Year Report on 1000 Patients Followed since Childhood, *Circulation, 4:* 836, 1951.

[6] Committee on Prevention of Rheumatic Fever and Bacterial Endocarditis, American Heart Association, Prevention of Rheumatic Fever and Bacterial Endocarditis through Control of Streptococcal Infections, *Circulation, 11:*317–320, 1955.

heart disease twenty years later, "insidiously and often without further recognizable rheumatic activity."[7] The possibility exists that penicillin prophylaxis over long periods of time may prevent such insidious progression of the valvular damage by eliminating streptococci from the body.

These three points suggest that the physician should be unusually careful to prevent the recurrence of rheumatic fever in all individuals who have had the disease in the past. Presumably this is particularly true when the patient has known valvular damage.

The duration of prophylaxis may be debated. It has been suggested that prophylaxis be continued until the patient has reached full maturity and is no longer living or working where he might have increased exposure to streptococci. The college physician must consider whether the patient is often exposed to crowds and whether there is a high prevalence of streptococcal disease in his geographical area. Because these factors increase the risk of streptococcal infection, they necessitate continued prophylaxis.

After the individual has discontinued regular prophylaxis, special prophylaxis may be indicated at the time of intercurrent respiratory infections. It is not known whether streptococci invade the nasopharynx more readily when virus respiratory infection exists than when the nasopharynx is normal, but obviously the two infections may exist simultaneously. While the normal person should usually avoid antibiotics if he has an infection of probable virus origin because of the danger of side reactions, the patient with a rheumatic background deserves the protection from recurrence of rheumatic fever by penicillin prophylaxis if the physician suspects the presence of streptococci.

The specific policy of the college physician may be discussed in summary under two categories:

1. Individuals who have a well-established history of rheumatic fever or chorea, or who have definite evidence of rheumatic heart disease with valvular damage should remain on prophylaxis for life, according to the recommendations of the American Heart Association. This recommendation is most important during the five years following an attack of rheumatic fever or when the individual is to be exposed to streptococcal infections in more than minimal degree.

[7] Bland and Jones, *op. cit.*

2. Individuals who otherwise qualify for prophylaxis, but for one reason or another have not received it and then develop acute illness, should receive penicillin if the possibility of streptococcal infection exists and they are not sensitive to penicillin. The suspicion of possible streptococcal infection is raised by the presence of sore throat or fever not definitely known to be due to other organisms or other disease, for example. Unless good evidence is obtained that streptococci are *not* present, penicillin in full therapeutic dosage should be continued for ten days to eradicate organisms. Thereafter prophylactic therapy should be instituted as recommended under category 1.

The standard prophylaxis is 200,000 units of penicillin two or three times daily by mouth (given one hour before meals or at bedtime on an empty stomach to ensure maximum absorption).[8] The administration of the long-acting injectable penicillin, benzathine penicillin, once monthly is effective and inexpensive,[9] but in our experience it may have the drawback of unusually prolonged urticarial reaction. Penicillin prophylaxis orally for the first week or ten days of each month has been reported to be effective,[10] but the results of this intermittent administration should probably be considered unproven for the present.

Sulfonamides are also effective in preventing streptococcal infections,[11] although they are inefficient in clearing streptococci from the body once established. Because of the risk of serious toxicity, they are less desirable than penicillin in prophylaxis.

In the care of the patient who has had rheumatic fever, preventive medicine and clinical practice merge. The physician's function is plural: to practice clinical medicine, to educate the patient, to assess the environment, and to act in co-ordination with the family physician. The college physician must use careful judgment and expert knowledge to maintain high standards.

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[8] Massell, *op. cit.*

[9] G. H. Stollerman and J. H. Rusoff, Prophylaxis against Group A Streptococcus Infection in Rheumatic Fever Patients with a New Repository Penicillin, *J.A.M.A., 150:* 1,571, 1952.

[10] K. H. Kohn *et al.,* Prophylaxis of Recurrences of Rheumatic Fever with Penicillin Given Orally: Final Report of Five Year Study, *J.A.M.A., 151:* 347, 1953.

[11] E. Roberts, Use of Sulfonamides to Prevent Recurrence of Rheumatic Fever: A 12 Year Study, *Am. J. Dis. Children, 85:* 643, 1953.

Fourteen Years of College Hospital Food Service

FLORENCE DEREMER, B.S., CORNELL UNIVERSITY

THE food services of a large student hospital encounter different problems than do similar services in a general hospital of the same size. For example, the average census in the student hospital has wider fluctuations; the average hospital stay is shorter; the age of the patients is more nearly uniform; special dietary problems are likely to be more limited; and there is a higher percentage of patients able to eat well and generously. In a college town students live in dormitories or in other places in which they cannot receive care when ill. At the onset of illness severe enough to cause absence from classes, many students enter the infirmary more for solution of their food problems than because they are in need of special medical attention. At large city universities, often proportionately more students live at home, hence the migration to the Infirmary when a wave of upper respiratory infections, gastroenteritis, influenza, or measles hits the campus is less evident. The old saying "feast or famine" when referring to a dietary load in a student hospital has roots in many a well-made observation. The average stay in a student hospital is short because most patients are ill with acute diseases which are of short duration. Both the age range of student patients and the nature of their illnesses indicate the need for a generous food budget. The college age group has the highest food needs both quantitatively and qualitatively of any age group. Though activity is reduced during hospitalization, in general appetities do not wane. The food habits of this age group are for the most part good. They want large quantities of meat, milk and eggs, fresh fruits, and vegetables, and have substantial calorie needs as well. This results in a relatively high food cost per person. The range of diagnoses for which therapeutic diets are required is narrow in the student hospital, hence the preparation of

special diets is not a large problem. In our experience, illnesses in the student group requiring diet therapy most frequently have been infectious mononucleosis with liver involvement, infectious hepatitis, peptic ulcer, and diabetes. Correspondingly the therapeutic diets most commonly ordered are high protein, high carbohydrate, low fat diets, bland diets; and diabetic diets. These usually may be modified from the regular menus without difficulty.

During the past fourteen years the Cornell University Infirmary food services have been operated under one medical director and, for the most part, under one food service supervisor. During this period of relatively constant administrative policy, a number of other factors have operated, however, which may influence the food service picture. The university enrollment increased from 6,800 to 10,500 and has finally stabilized at about 9,400 (Table 1); the composition of the student body varied during the war years. Although university enrollment increased, with the advent of antibiotics, there has been a decrease in hospitalization both in terms of hospital admission rates and in terms of length of hospital stay. In addition the period has seen a steady increase in food costs and tremendous changes in labor policies as well as labor wages. Having these factors in mind, we have reviewed experiences in the operation of the Cornell Infirmary food services over the past fourteen years.

A brief description of the food service set up at the Cornell Infirmary will be useful in interpreting the statistics to follow. The objective of the food service has been to provide adequate good food, properly and tastily prepared, and attractively served. Using a centralized food service, hot food is served in the main kitchen and trays placed in a heated food cart. Cold foods are placed on the trays by the nurses just before delivering the trays to the patients. Besides the dietitian, the dietary department is staffed by two cooks, a cook's helper, a salad woman, a dish-washing machine operator, a waitress, and two part-time relief persons—a total of six full-time and two part-time people. Four student helpers work two hours a day for their meals—one assists the waitress; another performs the chefs' helper's duties in the evening; two do the evening tray work and dishes. The use of the students enables the dietitian to have most of the employees on a straight shift of work. The dietitian has access to certain centralized purchasing and processing of foods by the University. A University

food purchasing agent buys all food for several food units on the campus including the Infirmary. In addition, the dietitian has access to products of the central bake shop, meat market, ice cream room, and storage plant. She merely orders from these central services. Since the average patient stay in the hospital is so short, menu rotation is possible. However, since certain hospital personnel have most of their meals at the Infirmary, menu rotation must be intelligently planned.

Table 1 portrays the entire fourteen-year experience with food service at Cornell Infirmary. The table reflects the increase in the campus census with the onset of the war period and the normal expansion following the war. The table also shows the drop in the Infirmary admission rate which reduced the number of patient days markedly below the prewar and wartime level, even though the campus population was greater. It is of interest to note that the total food cost at the Infirmary in 1940, when 53,181 meals were served, was approximately the same as when the Infirmary served about half as many meals (26,714) in 1953 (not shown in Table 1). Also, the number of man hours of labor was nearly the same. In other words, with the Infirmary serving a greater University student population (9,300) in 1953–1954 than in 1940–1941 (6,800), the total cost of food was the same and the manpower used was the same even though the number of patients fed and meals served had been reduced nearly 50 per cent. However, during this fourteen-year period, the total cost per meal had constantly advanced from 33½ cents in 1940 to 91 cents in 1954, nearly a threefold increase.

If we examine the table more closely we see that raw food costs have nearly doubled during the period. However, these costs are not out of line with what has happened in the national food index. The raw food costs per person, per meal index, increased from 58 to 103, while the country-wide food price index increased from 63 to 113. In both instances the 1947–1949 levels were used as 100 for the index.

During the period studied, labor costs advanced from 12½ cents per meal served to 53 cents. This appears to have been caused in part by use of more man hours per meal—during a period of decreasing patient load when a proportionate decrease in total man hours of labor did not occur—and in part by the increase in the average labor

cost per hour from 48 cents to $1.24 over the fourteen-year period. (The lower hourly labor cost for 1953–1954 resulted from a vacancy on the staff made possible by the unusually low patient census last year. Even with the unfilled position, total man hours were not reduced proportionate to the number of meals served.) The big increase in man hours per meal came in 1946–1947 and resulted from a sharp decline in meals served from the wartime high. A marked change in labor costs during the year 1947–1948 reflected the change in labor policy of 1947, whereby employees were paid on an hourly basis with time and a half for any hours over forty hours worked during a week. The scheduled work week was forty-eight hours. Another sharp increase in labor cost is noted in 1950–1951, when the work week was reduced to forty hours without a cut in take-home pay and the staff was compensated for overtime beyond forty hours with an extension of vacation time in the summer. Wages increased for everyone in 1947, but maintenance was no longer included. Instead, the policy of payroll deduction for meals and rooms was initiated. Table 1 shows that coincident with the changes in labor policy the man hours per meal increased markedly, due not so much to labor policy changes as to drop in patient census. The decrease in patient load resulted from a changing character of the university population. Beginning with 1946–1947 there were more civilians, veterans, and women and a smaller number of military personnel on campus. The effect of an increasing patient census on man hours needed per meal is shown in the year 1951–1952, when a decrease in man hours per meal occurred as the number of meals served increased. The increase of 3,000 meals served that year was the result of a measles epidemic, which brought the declining admission rate up to 217 per thousand students for that year.

The analysis presented below covers a period of time in this country from the end of the economic recovery from the great depression to the period of greatest postwar inflation. In 1940–1941 defense orders increased prices and wages somewhat over the depression levels. Nonprofessional personnel in hospitals still had job attitudes not unlike professional people. The day's job was done when the work was done for the day—a half-hour or an hour longer in the kitchen was not covered by a time clock or increased compensation. Many overtime hours were spent during busy periods by all person-

nel, and no one kept a record of the extra hours, so total man hours and man hours per meal from 1940 to 1946 in Table 1 are for regularly scheduled eight-hour days with no overtime hours. As inflation appeared during and after the war, labor unrest soon followed—a demand for a campus-wide policy occurred. When the forty-hour week was adopted as University labor policy, overtime became worth accumulating. The hourly wage and not the job received emphasis. Consequently the labor cost per meal went up faster and higher than raw food costs.

Review of our experience raises questions worthy of discussion. How can labor costs in a food service be reduced? How can a food service supervisor cope with the extreme range of patient census in a student hospital and give efficient economical service all the time? The pattern of patient fluctuation in a student hospital is definite, but wide (Table 1). What is the irreducible minimum to which the basic labor force can be lowered?

For the college planning to build an Infirmary, it would appear the best solution is prevention—that is, if possible, the student hospital should be located adjacent to another building with a food service and connected so that the staff would have a more uniform load—and a sharing of basic overhead costs.

For colleges with Infirmaries already in existence and which are confronted with high labor costs, the following questions can be asked:

1. Can the number of employees be reduced, thereby reducing the number of total labor hours? Wage cost per hour is usually beyond the dietitian's control if she adheres to the general University wage policy.
2. Can supervision costs be reduced?
3. Can a different employee attitude and wage scale be created if the Infirmary does not follow the general University employment policy—assuming permission to do so is obtained?

It appears that the problem of the basic number of food service employees is not unlike the nursing problem in a student hospital. The basic staff of each can be made to serve 1–40 patients. Then arrangements must be made to either work the employees longer hours (at overtime wages) or employ more people at times of extra demand. The latter solution brings up the problem of obtaining extra help

Table 1. An analysis of food services cost—Cornell Infirmary 1940–1954.

Year	*University enrollment*	*Admission rate per 1,000 students*	*Number patient days*	*Average Infirmary census*	*Range of census*	*Total meals served*	*Total man hrs. labor**	*Man hours per meal**	*Average labor cost per hour†*	*Labor cost per meal**	*Raw food cost per meal*	*Total costs per meal**
1940–41	6,800	368	9,956	36.4	3–103	53,181	13,850	.26	$ .48	$ .12½	$ .21	$ .33½
1941–42	6,800	266	6,741	25.5	1– 58	43,733	13,023	.29	.47	.14	.25	.39
1942–43	10,500	315	14,239	35.6	4–108	70,579	19,461	.29	.52	.14½	.28	.42½
1943–44	7,600	488	18,476	50.8	17–122	86,154	23,300	.27	.56	.15	.25	.40
1944–45	8,000	283	12,389	33.4	9– 61	65,420	20,391	.31	.58	.18	.27	.45
1945–46	10,500	241	12,128	33.2	4–130	61,637	21,261	.34	.60	.20	.29	.49
1946–47	9,200	205	8,225	22.5	1– 96	43,761	18,272	.42	.66	.30	.35	.65
1947–48	9,700	175	6,914	19.6	1– 52	42,482	19,308	.45	.91	.41	.35	.76
1948–49	9,500	158	5,941	21.5	3– 41	32,680	14,541	.45	.90	.40	.37	.77
1949–50	9,700	170	5,812	20.9	1– 35	32,244	14,104	.44	.92	.42	.35	.77
1950–51	9,700	165	5,980	21.5	3– 68	32,072	13,693	.43	1.02	.43	.35	.78
1951–52	9,600	217	7,928	26.7	3– 83	35,087	12,791	.36	1.21	.44	.37	.81
1952–53	9,400	195	6,335	22.6	1– 69	31,278	13,401	.43	1.24	.53	.37	.90
1953–54	9,300	135	4,602	16.6	1– 43	26,714	12,694	.47	1.12	.53	.38	.91

* These figures do not include cost and time for supervision of food services, i.e., dietitian's time and salary.
† These data are obtained by dividing the total labor cost per year by the total number of labor hours.

when needed. Where can a labor pool from which to draw be found in emergency? The problem of training new personnel in a hurry is great. Also, there is always the risk that when sickness such as "la grippe" is epidemic, sickness will occur in the staff too.

Another problem is that food services are such that there is need for greater labor load at meal times to insure good service and maintain high standards. That is, one person might be able to put everything on the trays but in order to do so would need to start so early that cold foods would no longer be cold and hot foods would be lukewarm.

This raises the question of supervision. Many college infirmary food services are managed by graduate students or faculty assistants. For the most part these infirmaries are near academic buildings, making it possible to use some academic personnel. At Cornell, however, the Infirmary is over a mile from the center of campus—neither student nor faculty assistance is practicable. Therefore a full-time dietitian has always supervised the food service, and when she has time off, a relief dietitian from Residential Halls is on duty. Supervision costs are not included in the figures presented in this paper, nor is the money value of meals for student help included in the labor-cost figures. A saving might be made in supervision cost by not employing a relief dietitian. However, again general University policy prevails here.

There is the problem of division in jobs to be performed. Nowadays a person is hired for a fairly specific job with the stipulation that other duties may be assigned only if necessary. Also, physical capabilities must be considered; the feasibility of one person scraping trays, washing dishes, and taking them out of racks must be dependent on the ability to perform all those functions and the availability of space and equipment for efficient work. While the present-day attitude toward jobs is less rigid at the Cornell University Infirmary, the influence of current labor practice is discernible. As new employees are hired to replace old employees, they usually have been previously imbued with the idea of strict division of labor.

As long as the Infirmary food services are an integral part of University policy in terms of employee relations, the dietitian can do no more than follow adopted campus-wide policies. However, because it is well known from hospital social studies that physically

handicapped people prefer to work in hospitals, and frequently are not qualified for employment elsewhere it might be possible to employ people with different work attitudes and different sense of values regarding hours and wages. It seems better in a college community to ask for no exceptions, to keep employee morale high and to try to solve the problem of high labor cost per meal by getting along with the lowest number of employees possible on the basic staff and provide for assistance during peak loads even if that assistance is costly for short periods. One point revealed by this study is the need for experimentation in our own hospital.

SUMMARY

A review of fourteen years' experience in the food service at the Cornell University Infirmary is presented. Figures of costs of operation and patient census reflect changes which are occurring at this student hospital. Admission rates per thousand students have been reduced from 368 in 1940–1941 to 135 in 1953–1954, with a similar decrease in patient days. Early use of ambulatory clinic facilities and antibiotic control of troublesome infections have markedly influenced the admission rate.

Total cost of food service has increased. Raw food cost per meal nearly doubled in the fourteen-year period but is within the national index; labor cost per meal more than quadrupled—largely caused by inflationary wage scales, established campus labor policies, and reduced occupancy. Total cost per meal has tripled in fourteen years. Problems arising from labor policy and reduced occupancy are discussed.

SUPPLEMENT TO

"A Classification of Academic, Social, and Personal Problems for Use in a College Student Health Department"

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As Monks and Heath pointed out in their April 1954 article in *Student Medicine,* none of the typical classifications is fully satisfactory for categorizing student problems. With respect to the Cornell Medical Index-Health Questionnaire, the Mooney Problem Check List, and psychological, educational, or social work classifications, they state: "None of these classifications completely fills the clinical and administrative need of student health work."[1] Nor does the revised nomenclature of the Committee on Nomenclature and Statistics of the American Psychiatric Association suffice for this purpose.[2] The APA nomenclature, under the general heading of "Transient Situational Personality Disorders," offers the classification "Adjustment reaction of adolescence," but this is of too broad a nature to be satisfactory for college work, since it is the *particular type of adjustment reaction* that we need to know about in our preventive and treatment efforts. This the Monks and Heath classification of student problems covers exceedingly well, with the exception of one major class—the special problems of foreign students.

That this area was neglected in the Monks and Heath system of classification is due to the fact that there has been a relatively small

[1] J. P. Monks and C. W. Heath, A Classification of Academic, Social, and Personal Problems for Use in a College Student Health Department, *Student Medicine, 2:* 44–62, 1954.

[2] *Mental Disorders* (Washington, D.C., 1952).

number of foreign students on American campuses and consequently a general neglect of the specialized problems of the foreign student in most institutions of higher education. From 1946 to 1954, however, the number of foreign students studying at American institutions has tripled, increasing from 10,341 to 33,833, an increase which promises to continue. This suggests that classifying the problems of these students ought to be attempted. In dealing with the problems of this growing group of foreign students, the college health service and other treatment facilities may be assisted by this classification to take appropriate prophylactic and treatment measures in co-operation with the university as a whole. If such classifications were used, records would be more complete.

When we use the term "foreign student" what do we mean? The Institute of International Education appropriately defines the foreign student as

a citizen of a country other than the United States who is studying or training in an institution of higher education in the United States, and who plans to return to his home country when his studies are completed. The term does not include Displaced Persons, immigrants, persons who have taken out first citizenship papers, or foreign citizens studying in the United States below the college level.[3]

An analysis of five years' work with foreign students at the University of Illinois Health Service has indicated the following *distinctive* problems of foreign students which would seem logically to have a place in any classificatory system of student probems.[4]

1. *Changed political conditions* (*FS-CPC*)—where the problem relates to a change of government in the student's homeland.

2. *Distance from Home* (*FS-DH*)—where the problem arises out of the distance from home when the student is in a foreign country for an extended period of time.

3. *Governmentally prescribed curriculum* (*FS-GPC*)—where the student has difficulties arising out of the compulsion to take a specified curriculum when his interests lie elsewhere or his aptitudes suggest otherwise.

[3] *Education for One World* (New York, 1954), p. 4.

[4] A rationale for counseling with foreign students, the distinctive nature of the problems of foreign students, case examples, and a bibliography of materials in the field of counseling with foreign students are more fully treated in J. Otis, "Psychotherapy with Foreign Students in a University," *Mental Hygiene,* 1955. (In press.)

4. *American academic pace* (*FS-AAP*)—where the problem arises out of the increased pace of work as compared with academic activity in the student's homeland.

5. *Belief in magical thinking* (*FS-BMT*)—where the problem develops out of magical thinking of a cultural rather than schizophrenic nature.

6. *Negative American attitudes* (*FS-NAA*)—where the problem arises when the student meets hostile attitudes among citizens of this country, usually in landlords, at restaurants and barbershops, or at a place of work.

7. *Character of American culture* (*FS-CAC*)—where the student has problems in adjusting to American folkways and mores because of the contrast to those of his native culture, as in food and sexual attitudes.

8. *Rationalization of Academic failure* (FS-RAF)—where the student tenaciously rationalizes academic failure as due to his being a foreign student when the real reason lies elsewhere.

9. *Comprehension of English* (*FS-CE*)—where the problem develops out of the student's difficulty with the English language.

It is believed that the above-mentioned categories of foreign student problems are a valid and important supplement to the Monks-Heath classificatory system of problems found in college student health services. If college health services studied and compiled their records according to this classification, they might better prevent or treat those difficulties which foreign students often face while studying in institutions of higher learning in this country.

The Use of Liquid Nitrogen in Student Medical Practice

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LIQUID nitrogen was used for the treatment of warts in the Cornell Medical Clinic for the first time in 1948. Its use has been attended with such success that other methods of treating the common wart, or verucca vulgaris, have been largely abandoned. Although some warts are very resistant to other forms of therapy, it is unusual to find verrucae which fail to respond to this treatment, but it does happen. Simple freezing, accomplished by the local application of liquid nitrogen for a short time, is the only requirement for successful removal. Aftercare is simple; dressings are usually unnecessary. This results in a saving of time for every one concerned. Warts treated by electro-dessication need dressings and result in varying degrees of disability until healing is complete, which often takes two weeks or more. A wart treated with liquid nitrogen may remain sensitive for a few days, but it almost never requires a dressing, even when on exposed parts such as the hand. After treatment, the hands may be washed as necessary with soap and water. Infection almost never occurs. Thus we have a method ideally suited for the removal of warts in college students, an age group having a high susceptibility to this virus infection. In this clinic each physician treats his own patients. In some offices, a nurse specially instructed in this method carries out the treatment for the prescribed length of time.

Liquid nitrogen is a clear, colorless liquid, having a temperature of minus 321 degrees Fahrenheit, and is nonexplosive, noninflammable, and volatile. It is produced as a by-product of the manufacture of oxygen. Our supply is obtained once or twice weekly from the Uni-

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versity Department of Physics and stored in an insulated pyrex vacuum bottle which is loosely stoppered. (Liquid nitrogen should not be kept in a tightly closed container.)

Applications to the skin lesion are made by the use of a cotton-tipped applicator which has been dipped into liquid nitrogen. Freezing occurs almost instantaneously at the point of contact, and by repeated applications thorough freezing of the lesion and a small surrounding zone of uninvolved skin can be accomplished and maintained for any desired length of time. For small warts, up to .5 cm. in diameter, one to three minutes suffices. In general, the larger the wart and the thicker the skin of the area in which it is situated, the longer it needs to be frozen. Some very large warts may require freezing for as long as ten minutes. Freezing, once begun, must be continued without interruption. Multiple warts—five or six, or even more—can be treated at one visit without the patient experiencing undue discomfort. After completion of treatment, thawing occurs quickly, resulting in little or no immediate change in the appearance of the lesion. Slight pain is felt for a short time after treatment is finished. Twelve to fourteen hours later the wart may be somewhat red and swollen. Vesiculation usually appears within twenty-four hours, beginning at the periphery and extending to elevate the entire wart from its base. The fluid in the blister may be clear or sero-sanguinous. In three or four days the wart becomes reddish-brown in color and starts to shrink in size, while the blister becomes less tense as the fluid is slowly reabsorbed. Usually within seven to ten days the residual crust or dried up wart separates from the skin and comes away leaving a tiny crater. Final healing is complete in about two weeks.

Scarring, frequently seen after electro-dessication of warts, rarely occurs after treatment with liquid nitrogen. An excellent cosmetic result is obtained, an important objective in treating lesions on exposed surfaces where warts usually occur. Flat warts on the face, ordinarily resistant to all other forms of treatment, can be readily and permanently removed by lightly freezing each lesion for a few seconds with liquid nitrogen applied with a small cotton-tipped applicator. This gives an excellent result with no scarring.

Plantar warts also can be treated successfully with liquid nitrogen. Here the problem is somewhat different, since one is dealing with a

deep, "ingrowing" lesion instead of a superficial tumor. This "ingrowing" tendency results from the more or less constant pressure produced by weight bearing. To complicate matters further, a wart on the plantar surface of the foot is subject to constant trauma. Nevertheless, such warts do yield very well to freezing, except those with underlying orthopedic defects, and a great percentage have been cured by this method.[1] The technique is as follows. If heavy callus is present, it is first removed by appropriate means, then the wart is outlined with ink so that its margin is readily seen, then liquid nitrogen is applied, freezing the entire wart plus a surrounding zone at least two or three millimeters in width. Freezing is maintained constantly for ten to fifteen minutes, and no thawing is allowed during this period. Thawing takes place quickly after treatment. The treated area becomes red and swollen in a few hours, and vesicle formation begins. Within seventy-two hours a blister has formed which elevates the wart and obscures its borders. If the wart is at a weight-bearing point, comfort and protection can be afforded by a sponge rubber pad cut to fit around the wart. The patient returns one week after freezing for removal of the wart. This is accomplished by opening the blister along the edge, thus allowing the fluid to escape. Then with small sharp scissors the entire wart is cut away, the only attachment at this time being the epidermis around the periphery, the "root" or central deep attachment having been completely freed by hydrostatic pressure of the fluid within the blister. A sterile dressing is applied, and the patient is instructed to change the dressing daily. Complete healing without scar formation occurs in a week or so; after this the patient should return for final inspection.

The authors have found it best not to treat an acutely irritated or infected plantar wart. If infection is present freezing may result in the development of cellulitis of the surrounding area. If the wart is acutely tender as a result of friction or weight bearing, freezing frequently will produce a very painful reaction. Therefore, measures to clear the infection, and padding or rest to relieve the irritation, should be employed before attempting to remove the wart.

The mosaic form of plantar wart is less successfully treated by this method than are the more common solitary warts just referred to.

[1] J. B. Mathewson, Liquid Nitrogen in Dermatology—A Successful Method of Treating Plantar Warts, *N.Y.S. J. Med., 55:* 374–375, 1955.

Freezing with liquid nitrogen can be used with considerable success in small mosaic warts, but in the case of larger areas of involvement (over one centimeter in diameter) it has proven difficult to attain complete removal.

Liquid nitrogen produces some local anesthesia by virtue of being cold, just as ethyl chloride spray or the application of ice does. Despite this effect some few patients complain of undue pain, especially at the beginning of freezing and during the thawing-out period. Occasionally, the pain continues for an hour or two after treatment. This largely can be prevented by infiltrating the area with a few cubic centimeters of one-per-cent procaine solution just before freezing is begun. Although walking is permitted after treatment, it should be limited as much as possible during the first few days. After excision of the wart, the patient has little or no discomfort and healing is completed uneventfully.

While the primary purpose of this paper is to describe the treatment of warts by means of liquid nitrogen, it should be observed that this form of therapy has been used in numerous other dermatological conditions. In some it has been found to be a valuable addition to the methods already in use; in fact, in some instances it has proved to be their superior. Table 1 lists these conditions.

Table 1. Conditions effectively treated with liquid nitrogen.

Common warts, except on nail folds and palms or over one cm. in diameter
Flat warts
Plantar warts, except the mosaic form
Seborrheic keratoses
Granuloma pyogenicum
Sebaceous cyst
Acne keloidalis of neck and scalp
Lichen simplex chronicus
Nevus araneous
Granuloma annulare
Molluscum contagiosum

The length of time during which freezing is maintained for most of these conditions other than warts is relatively short. It must be in-

dividualized for each lesion; and the depth of involvement, and the size and nature of the lesions must be taken into account, as well as the thickness of the skin in the area being treated. The proper duration of treatment is readily learned by the experience gained in treating a few cases. In general, nevus araneous and flat warts should be kept frozen only about five seconds; molluscum contagiosum from fifteen to thirty seconds; granuloma pyogenicum, infected sebaceous cysts, acne keloidalis, and lichen simplex chronicus from one to two minutes. If granuloma annulare lesions are small, the entire lesion may be frozen for about three minutes, but if the ring is large it need not be completely frozen; treating two or three separate areas around the ring will result in healing.

One of the authors (J.B.M.) has, in his private practice, found that some other dermatological conditions found in the older age group can also be successfully treated with local application of liquid nitrogen. It has been especially satisfactory for removing seborrheic keratoses, epidermoid epitheliomata (Bowen's disease), and the lesions of multiple epitheliomatosis. In certain other conditions its use has been attended with some success, but in general results have been less satisfactory for some reason than with the well-known methods presently in use. For example, warts of nail folds can be successfully removed by freezing with liquid nitrogen, this having the advantage of producing no scarring or permanent deformity of the finger nail. Freezing of the nail fold, however, is sufficiently painful that many patients will not tolerate it, and the failure of complete removal rate is fairly high. Table 2 lists those conditions where liquid nitrogen therapy has been found to have limited usefulness.

Table 2. Conditions in which liquid nitrogen has limited usefuless.

Common warts on nail folds and palms or over one cm. in diameter
Mosaic warts
Warts, venereal
Hemangiomata, cavernous
Nevi, vascular adult type
Nevi, pigmented, hairy
Keloids
Calluses

Scarring rarely occurs after freezing with liquid nitrogen. When it has been seen, the degree of scarring was not necessarily more than might have followed any other form of therapy. Nevertheless, great caution should always be used if the skin of the face is involved, just as it should be in any other treatment of this region. For this reason we have been reluctant to treat infected sebaceous cysts or other deep lesions of the face which require more than a short period of freezing.

SUMMARY

A form of cryotherapy, using local applications of liquid nitrogen, has been described for use in treating skin disorders seen in a student medical clinic. This method has proven to be very satisfactory for most warts. A list of other conditions which are successfully treated is included. A second list includes some conditions in which it has limited usefulness.

The advantages of liquid nitrogen therapy are: ease of application, minimal aftercare, prompt healing, and minimal scar production.

A Progress Report on the Student Stability Studies

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THREE years ago a research project on student adjustment was undertaken at Cornell University. These studies, sponsored by the Department of Clinical and Preventive Medicine, have been concerned with 1,818 students of the class which entered the University in September 1948. A number of studies, all focused on this one group of students, are beginning to delineate some of the factors which influence success and failure at Cornell.

The research to date has been based almost entirly on records. All types of records have been searched: medical histories, medical charts, admission blanks, grade records at Cornell, graduation lists, athletic award lists, campus activity records, disciplinary action lists, etc. Data were recorded on IBM cards and analyses were subsequently carried out on business machines at Cornell. The work was supervised by the authors, and confidential data were coded so that they were intelligible only to those working on the project.

Three graduate students in the School of Education at Cornell have participated in this project. As a result one Ph.D. thesis and two M.A. theses are counted among the Student Stability Studies. Research for a third M.A. thesis is in progress.

Some of the findings of the Student Stability Studies are presented below. The procedures and results are only summarized here, but references to complete papers are given. The differences reported have been tested for statistical significance by conventional formulae.

ATTRITION

The prime fact about attrition is that 41 per cent of the freshmen who entered the University in 1948 failed to graduate. This rate of attrition is no greater, in fact less, than that found at most compar-

able institutions.[1] Yet this figure represents a great sum of misspent energy, frustration, and unhappiness. From the economic standpoint these students must be counted a poor return on a substantial investment by families, the University, and the wider community.

The data for this class show that about 25 per cent of the students who left were dropped for academic reasons. Another 25 per cent had been in academic difficulty (on probation, had been warned, etc.) before they left. The remaining 50 per cent dropped out of the University in perfectly good academic standing. Why they left is, for the most part, unknown. Attrition in spring semesters is about twice as great as it is in fall semesters. A good many students leave in June and fail to reregister in September for reasons never communicated to the University. There is a clear need for follow-up research on the whereabouts and progress of these individuals.

Attrition among Men in Arts and Sciences

Attrition among males who entered the College of Arts and Sciences in 1948 was carefully studied by Martha Thompson.[2] She found that certain factors were significantly related to attrition. These included: Scholastic Aptitude Test scores, academic rank in high school, and the size of the high school graduating class (the larger the class the better the chances of graduating from college). Miss Thompson's data also indicate that men who plan to finance their college education by self-help have somewhat better chances of graduating than men relying entirely on parental support. Among factors with no apparent correlation with attrition were: age at matriculation, the amount of formal education of the parents, and public versus private secondary schooling. This investigator suggested that further research might profitably be concerned with relationships between attrition and the following factors: size of the student's family, educational and vocational goals stated at matriculation, and type of residence at college.

Attrition among Women in Arts and Sciences

Academic success and failure among women who entered the Col-

[1] Archibald MacIntosh, *Behind the Academic Curtain* (New York: Harper and Bros., 1948).

[2] M. M. Thompson, "Admission Information as Predictors for Graduation" (unpublished Master's thesis; Cornell University, Sept., 1953).

lege of Arts and Sciences in 1948 was investigated by Jane McCormick.[3] She found correlations between success and Scholastic Aptitude Test Scores and between success and graduation from large high schools. The daughters of college women were somewhat more likely to earn degrees. And more active participation by the student in extracurricular programs (including sororities) at both high school and college augurs well for academic success. In the case of women in Arts and Sciences, rank in high school is not related to attrition. (This finding undoubtedly reflects the fact that 81 per cent of the women stood in the top fifth of their graduating high school class.) There was no relationship between attrition among women and their plans for financing college through self-help. Findings such as this indicate that there are sex differences in the factors affecting withdrawal from college.

SEX DIFFERENCES IN ADJUSTMENT AT COLLEGE

The present authors conducted a survey of sex differences in adjustment to college as reflected in class records.[4] The chief findings are summarized here.

There are no differences between men and women in rate of attrition. That is, women comprised 22 per cent of the matriculating class and 21 per cent of the graduating class. As far as grades are concerned, women who dropped from the University and the women who graduated were, on the average, in better academic standing than male students. The women who left were more likely to do so for nonacademic reasons than was the case with men. Contrary to often expressed opinion, there is no evidence from previous research[5,6,7,8] that marriage plans are responsible for an appreciable

[3] J. E. McCormick, "Individual Factors Associated with Academic Success" (unpublished Master's thesis; Cornell University, June, 1954).

[4] J. Summerskill and C. Darling, Sex Differences in Adjustment to College. *J. Educ. Psychol.*, 1955. In press.

[5] D. S. Feder, Student Population. In *Encyclopedia of Education*, ed. by Walter S. Monroe (New York: Macmillan, 1950).

[6] E. Havemann and P. West, *They Went to College* (New York: Harcourt, Brace, and Co., 1952).

[7] J. H. McNeeley, *College Student Mortality* (Bull. 11, U.S. Dept. Interior, Office of Education; Washington, 1938).

[8] R. G. Weintraub and R. E. Sally, Graduation Prospects of an Entering Freshman, *J. Educ. Res., 39:* 116–126, 1945.

part of the attrition among college women. The present authors are of the opinion that there are sex differences in motivation about college. The Student Values Study, conducted at Cornell prior to the Stability Studies, showed that men are more likely to see a college education as a road to a job and a livelihood.[9] The data from the present studies suggest that many young men quit college because they cannot make it, whereas many young women quit simply because they do not wish to continue.

Analysis of activity records shows that women are represented according to population in campus leadership posts. At the same time, complete nonparticipation in organized campus activities is somewhat more characteristic of male students. This likely reflects the higher percentages of veterans, married students, and students in off-campus residence, among the male student body. In general, the data show that co-education clearly extends to organized student activities on the present-day campus.

Sex differences in health adjustment were investigated. This involved a time-consuming analysis of the medical charts spanning the college careers of 1,155 students in this class. Ninety-five per cent required medical attention at college. According to these data, women are more likely to have poor health records. For example, women account for 29 per cent of the students who have more than fifteen medical complaints at college. On the other hand, women account for only 17 per cent of the students with virtually no medical complaints. The sex difference in health was particularly evident in complaints of upper respiratory illness, which is the most prevalent medical disorder among college students. Upper respiratory complaints among college women are 35 per cent more frequent than among college men.

The question is still unanswered as to whether women actually experience more physical illness[10,11] or have lower thresholds for seeking medical attention.[12] One consideration which favors the lat-

[9] Cornell Social Science Center, "Report on the Cornell Student Body" (June 1951). Mimeographed.

[10] A. Ciocco, Sex Differences in Morbidity and Mortality, *Quart. Rev. Biol., 15:* 59–73, 190–210, 1940.

[11] S. D. Collins, Cases and Days of Illness among Males and Females, *U.S. Publ. Health Serv. Report, 55:* 47–93, 1940.

[12] F. H. Lund, Adolescent Motivation: Sex Differences, *J. Genet. Psychol., 64:* 99–103, 1944.

ter explanation here is that all women in this class lived in University dormitories and sororities, but most men lived off campus. The counseling system in the University residences promotes prompt requests for medical attention.

This study leads to the general conclusion that there are sex differences in adjustment to college but that the direction of the differences depends upon the specific area under consideration.

RELIGIOUS DIFFERENCES IN ADJUSTMENT AT COLLEGE

The researchers collecting data for these studies observed that the student's stated religious preference seemed to be related to performance in college. A systematic analysis of the data according to religious preference was carried out.

Attrition rate is not influenced by religious preference. However, the proportion of Protestants among those who drop out (as opposed to fail out) is low; and the proportion of Hebrews among those who drop out is high. Students of the Jewish faith who stay at the University have a better-than-average chance of getting excellent grades. It was found that Roman Catholics in this class were less likely to be in campus leadership posts and were less likely to get excellent grades.

Data from medical charts showed that Protestant students are underrepresented in the poor health group and Jewish students are overrepresented in that group.

The three major religious groups are represented among the disciplinary problems in this class in normal proportions.

This particular study is being continued by the authors in collaboration with David Shapiro, Clinical Psychologist, Tompkins County Mental Health Clinic. The immediate problem is to determine whether the above results are associated with religious or ethnic factors. To this end the college performances of the various religious groups are being analyzed in terms of parents' birthplace, family place of residence, and so on. The authors hope to present the findings in detail in the near future.

INTERCOLLEGIATE ATHLETICS

A study on intercollegiate athletics was conducted by Thomas Bentson.[13,14] Two groups of athletes were compared. Both groups had participated in organized athletics in high school and in their freshman year at Cornell. One group continued its athletic activities at the University and won letters for intercollegiate play in major sports. The other group did not participate in intercollegiate athletics.

Bentson found that the athletes who had success at the intercollegiate level were, on the average, significantly taller and heavier when they entered Cornell than the students who did not continue athletics after their freshman year. These athletes had also spent more hours at high school sports. The two groups differed in religious composition—fewer Jewish students were among the letter-winners at college.

The intercollegiate athletes obtained somewhat lower grades than the other athletes. At the same time, their Scholastic Aptitude Test scores were somewhat lower. Thus, as a group, the varsity athletes came to the University with somewhat lower aptitudes and obtained grades commensurate with their aptitudes.

The varsity letter-winners spent more time in the Cornell Infirmary because of injuries. The incidence of common illnesses was similar in both groups.

Bentson conducted personal, one-hour interviews with seventeen athletes from each group. He reports that the letter-winners were highly satisfied with intercollegiate athletics. In comparison with non-winners, they were more satisfied with the amount of time these activities required although their participation in other campus activities was appreciably reduced. Of some significance is the fact that the letter athletes clearly felt that their esteem on the campus was greater because of athletic achievement. They rated esteem due to athletics much higher than it was rated by the other group. The investigator reports that success in intercollegiate athletics at this university is accompanied by rewarding feelings of social interaction and belonging-

[13] T. Bentson, "The Relation of Personal Success in Intercollegiate Athletics to Certain Aspects of Personal Adjustment." Unpublished PhD thesis, Cornell University, June, 1953.

[14] T. Bentson and J. Summerskill, The Relation of Success in Varsity Athletics to Campus, Health, and Scholastic Adjustment, *Res. Quart.*, 1955. In press.

ness. He suggests that further research be conducted to determine how lasting these effects are.

This study points up the injury risk associated with intercollegiate athletics. On the other side of the ledger, varsity athletes have highly favorable things to say about their participation in the program at Cornell and its psychological consequences.

EDITOR'S NOTE: Current studies in the Student Stability series deal with the incidence and patterning of upper respiratory illness among college students. Summaries of these and subsequent studies will be published from time to time in *Student Medicine*.

Case Reports of the Cornell University Infirmary and Clinic

A Case of Aseptic Meningitis

Dr. Rachun: "This is the case of a nineteen-year-old girl in the College of Arts and Sciences who was admitted to the Infirmary on the evening of April 21, 1954. Her complaints consisted of headache and fever. The headache, located in both frontal and occipital regions, started the evening before, and when she awoke the next day, it was still present. It persisted throughout the day and she did not go to classes. In addition she noticed pain extending down her back. It ranged from her neck all the way down to the lumbar area and extended into the posterior of both thighs. There was slight nausea, but no vomiting. She had had no recent upper respiratory infection or other complaints. The past history revealed that she had not had mumps; there was no known association with anybody who had tuberculosis, and there was no recent medical illness other than the presence of a few slightly enlarged lymph nodes in her left inguinal region about two weeks previous to her illness for which she had made a clinic visit. Th se were attributed to a mild folliculitis of the thigh.

"Physical examination revealed a well-nourished, well-developed young female who, although slightly drowsy, responded well to questioning. Her temperature was 101.6 degrees rectally. The neck was found to be stiff. The fundi were not visible through constricted pupils, and the only other finding was a possible diminution of the abdominal reflexes on the left side. Kernig's sign was negative.

"A lumbar puncture was performed, and the pressure was found to be 170 mm. of water; the cerebrospinal fluid was clear, cells numbered 870, mostly mononuclears. Sugar was 79 mgm. per cent; protein was 196 mgm. per cent; globulin was 4 plus. The smear of the

cerebrospinal fluid for bacteria was negative and cultures were sterile. White blood cell and differential counts were done. The results were white blood cells, 17,350; polymorphonuclear cells, 75 per cent; lymphocytes, 22 per cent; monocytes, 3 per cent; stab forms, 3 per cent. Urinalysis revealed no abnormal findings.

"On the following day the patient's headache was improved and the temperature came down to normal and remained normal throughout her course. The headache also became less intense. It persisted for perhaps an hour or two a day. The improvement was fairly striking after the first evening. Five days after admission lumbar puncture was repeated. The finding were: 56 mgm. per cent of total protein; the globulin was one plus. The cell count now had fallen to 387 cells per cubic millimeter, and about 95 per cent of these were mononuclears. Another blood count revealed the following: white blood cells, 10,300 with 46 per cent polymorphonuclear cells; lymphocytes, 45 per cent; monocytes, 2 per cent; eosinophiles, 7 per cent; toxic granulation of neutrophiles was observed. The heterophile agglutination test was negative.

"The patient was placed on sulfadiazine empirically when she first came to the Infirmary, but the drug was discontinued when it was evident that no bacterial infection was present. The differential diagnosis on admission was an early meningitis, poliomyelitis, or aseptic meningitis. She was seen in consultation by Dr. Broad,[1] who felt it might be a nonparalytic form of poliomyelitis, but he leaned more toward a diagnosis of lymphocytic choriomeningitis. In any event she improved quite satisfactorily, and on her ninth hospital day she was discharged. Follow-up in the Clinic revealed that she still had a headache which came on particularly if she walked around a great deal. On one occasion she stayed up until three o'clock in the morning writing a term paper, and that aggravated her headache quite severely. However, when seen in the Clinic, she said that she was having headache for a short time, perhaps an hour a day, and that it could be controlled easily by lying down."

Dr. Wightman: "A case of this type is always a puzzling one, when one considers the possible diagnoses. When she was first seen, we didn't know whether we were dealing with a bacterial invasion of the central nervous system or not, and no time was lost in doing a spinal

[1] Tompkins County Health Officer.

tap. We have looked up some literature on the so-called entity of aseptic meningitis, into which category this case appears to fall. There is a recent article which covers the subject very well, and I'm going to ask Dr. Sayers to summarize it here. Later, Dr. Tracy will refresh our minds on characteristic laboratory findings in various lesions of the central nervous system."

Dr. Sayers: "This is an article in a recent volume of the *Annals of Internal Medicine*[2] on aseptic meningitis written by Adair, Gauld, and Smadel. They reviewed 854 cases of aseptic meningitis occurring in military personnel and their dependents between 1941 and 1952. Of these 854 cases they were able to make definite specific diagnoses in only about 30 per cent of the cases. Roughly, 10 per cent were due to lymphocytic choriomeningitis, 10 per cent to mumps meningitis, and the other ten per cent were divided between leptospirosis and herpes simplex.

"In making the diagnosis of aseptic meningitis, they used Wallgren's six criteria promulgated back in 1925:

1. Disease of acute onset with obvious signs and symptoms of meningeal involvement.
2. Alteration of cerebrospinal fluid typical of meningitis. The cerebrospinal fluid may show a large or small number of cells.
3. Absence of bacteria in the cerebrospinal fluid as demonstrated by direct or cultural techniques.
4. Relatively short, benign course of illness.
5. Absence of local parameningeal infection (otitis, sinusitis, etc.) or a general disease which might present meningitis as a secondary manifestation.
6. Absence from the community of epidemic disease of which meningitis is a feature.

"Having made a clinical diagnosis on these grounds, they submitted cerebrospinal fluid and blood sera to their laboratories for a series of rather complicated tests which they give in detail in their article. For lymphocytic choriomeningitis there were complement fixation tests and antibody neutralization tests, and for mumps they insisted on a fourfold rise of antibodies in the convalescent serum. For

[2] C. V. Adair, R. L. Gauld, and J. E. Smadel, Aseptic Meningitis, A Disease of Diverse Etiology: Clinical and Etiologic Studies on 854 Cases, *Ann. Int. Med.*, *39*:675–704, 1953.

leptospirosis there was the microscopic agglutination-lysis test, and for the herpes simplex virus there was the egg-neutralization test. They then described in some detail the clinical pictures of those cases which they were able to diagnose accurately.

"Ninety-eight per cent of the lymphocytic choriomeningitis cases had headache, compared to 97 per cent of the mumps meningitis cases. Ninety per cent had stiff necks with lymphocytic choriomeningitis, and 85 per cent with mumps meningitis had stiff necks. Virtually all had fever. It is interesting to note that the average duration of fever in lymphocytic choriomeningitis was shorter than in mumps meningitis (5.8 days in the former case and 7.3 days in the latter). Other signs in cases of lymphocytic choriomeningitis were: nausea and/or vomiting, 65 per cent of cases; malaise, weakness, aches and pains, 35 per cent; abnormal neurological findings were found in only 20 per cent of the cases. There was respiratory involvement in 20 per cent; conjunctivitis in 19 per cent; abdominal pain in 8 per cent; and backache in 13.9 per cent. As to the state of consciousness of these patients, 70 per cent of those having lymphocytic choriomeningitis were completely alert throughout the illness; 24 per cent were drowsy or lethargic at one stage or another; 2 per cent were in semicoma; and 2 per cent in coma. The 2 per cent that were in coma subsequently died.

"In mumps meningitis the findings were very similar: 97 per cent had headache; 95 per cent, stiff neck; 98 per cent, fever; 66 per cent, nausea and vomiting; 20 per cent, malaise, weakness, various aches and pains; 23 per cent, abnormal neurological findings; 12 per cent, respiratory involvement; 6.9 per cent, conjunctivitis and photophobia; 14 per cent, abdominal pain; 12 per cent, backache. Sixty-three per cent were alert throughout their illness; 23 per cent were drowsy at one stage or another; and 10.5 per cent, a rather high percentage with mumps meningitis, were in semicoma at one stage or another. Two per cent were in coma.

"An interesting feature that they brought out was that about 35 per cent of the lymphocytic choriomeningitis cases had a history of a prodromal disease about ten days before the onset of meningeal signs. This was of an influenzalike nature for a few days and then cleared, followed by the onset of meningeal symptoms ten days later.

"Having made a diagnosis on clinical grounds, they then discussed

how one could endeavor to correlate it with cerebrospinal fluid findings. They give a list of some of the findings in these four diseases, and it is clear that the cell count tends to be highest in lymphocytic choriomeningitis, rather lower in mumps meningitis, and a little lower still in the other two conditions. They found a range from zero up to about 6,000 cells for lymphocytic choriomeningitis and up to only about 1,700 cells for mumps meningitis. The protein tests are rather higher in lymphocytic choriomeningitis. They quote a mean value of 112 mgm. per cent in that condition and 72 mgm. per cent, which is about the upper limit of normal, in mumps meningitis, and the protein is a little lower in the other two conditions. They also mention an interesting seasonal variation in these diseases. Lymphocytic choriomeningitis has a very definite peak in mid-winter, December and January, and mumps meningitis has a definite peak in April and May.

"They discuss their findings at some length and devote some time to theorizing about the 70 per cent of cases which they could not diagnose. No doubt some of these cases represent nonparalytic cases of poliomyelitis which occur in and out of the poliomyelitis epidemic season. Other agents that have been shown to produce acute aseptic meningitis in the absence of the more common manifestations of the illness are the viruses of lympho-granuloma venerum, mononucleosis, infective leukocytosis, the Coxsackie group of viruses and the arthropod borne form of encephalomyelitis, eastern and western equine encephalitis, and a host of others. They mention the fact that other writers have noted pneumonitis in some cases of benign lymphocytic choriomeningitis and that chest findings were absent in their series.

"To sum up, then, these four diseases present very similar clinical findings. They are usually benign. Very few of them show any neurological findings even at the height of the acute illness. Very few of them, indeed, less than 2 per cent, showed any permanent disability, but there was a definite tendency for the cases of lymphocytic choriomeningitis, mumps, and leptospirosis to be milder than the cases of herpes simplex. The herpes simplex cases ran a fever for about two weeks, whereas the rest of them were afebrile within the week. I think that is about the burden of what these gentlemen had to say."

Dr. Wightman: "Thank you very much. As I understand it, the virus laboratory at Walter Reed Hospital was the diagnostic center

where specimens obtained from the armed forces patients and the Veterans Administration patients were sent. I think our own New York State Health Department is equipped to do some of these tests that you described for lymphocytic choriomeningitis, herpes, mumps, etc. As I recall, they require a blood specimen obtained at the time of hospitalization or within a few days after illness and a second specimen in a matter of four to six weeks afterward. The diagnosis is made by examining paired sera and noting the presence of specific antibodies, especially an increase in antibodies. This is not very practical from the standpoint of treating these cases because usually they are well by the time the diagnosis is made. Now Dr. Tracy is going to talk about cerebrospinal fluid findings in other conditions, and we shall see how close we can come to a diagnosis through the help of cerebrospinal fluid findings."

Dr. Tracy: "The information that I was able to find did not include many of the conditions that Dr. Sayers mentioned, and I don't have any information on the various serum agglutination, complement fixation, and egg-neutralization tests, and so on. I did put down the essential findings that are found in the more common conditions, and I have a little bit about meningitis itself. Clinically it is usually impossible to tell which part of the meninges are involved, but by pathological and by post-mortem diagnosis meningitis may be classified into categories depending on whether the cerebral or spinal meninges are involved, and also depending on whether the pia-arachnoid or the dura is involved.

"The usual cause of meningitis is infection with various organisms, but the meninges are sensitive to irritation by bacterial toxins, by lead, alcohol, other chemical agents, and also by trauma. These latter things, lead, alcohol and chemical agents, cause meningismus. The cerebrospinal fluid is sterile in these cases. The meninges are also highly susceptible to irritation and inflammation by sterile fluids injected into the spinal canal. One article written in 1944 mentioned the most common organisms which cause meningitis. I was surprised to note that treponema pallidum was listed first, with meningococcus second; tubercle bacillus third; pneumococcus fourth; hemolytic streptococcus fifth; and haemophilus influenzae sixth. Less frequent were staphylococcus, Friedlander's bacillus, colon bacillus, typhoid bacillus, and others. Mixed infections can occur, but are rare. The

meningitides may be classified as primary or secondary; that is, the meningitis is considered to be primary when it arises without any apparent focus of infection or previous infection. In secondary meningitis there is some infection elsewhere, which spreads to the meninges.

"In bacterial meningitis, the diagnosis can usually be made from the high polymorphonuclear cell count in the cerebrospinal fluid. However, in the initial stage the cerebrospinal fluid may be clear. It is stated that there must be at least 200 cells per cubic centimeter to cause cloudiness of the fluid. The authors recommend that Gram's stain of cerebrospinal fluid be done immediately, because from the Gram's stain alone one can frequently make the diagnosis before the culture is reported. For example, gram negative diplococci are usually meningicoccus; gram negative bacilli suggest influenza bacillus; and gram positive cocci suggest pneumococcus, staphylococcus, or streptococcus. Cultures should be made promptly, especially in cases of suspected meningicoccus infections because the organisms die rapidly; and ½ to 1 cc. of fluid should be used as the inocculum rather than a loopful, for the smaller amount may give a false negative culture.

"Now, I would like to call your attention to the chart which I have drawn on the blackboard. It depicts the findings in normal spinal fluid as well as the findings in various inflammations of the central nervous system. The list obviously is not complete; nevertheless, it serves as a useful guide.

"Running through the salient points, you can see that in tuberculous meningitis the cells in the spinal fluid are increased. In the early stages, polymorphonuclear cells may predominate; later, lymphocytes. Perhaps even more important is the decrease in both the sugar and the chloride content. Little need be said about syphilitic meningitis, in which a positive Wasserman is found in 85 per cent of the cases. As you can see, without the clinical picture, poliomyelitis is difficult to diagnose from the spinal fluid. Note here, too, just as in tuberculous meningitis, the increase in cells in the cerebrospinal fluid may be due at first to polymorphonuclear cells; later, to lymphocytes. In the Guillain-Barre syndrome, typically, there is dissociation between cells and protein; that is to say, the cell count is low or normal, but the protein is high. A word of caution on this observation is nec-

essary: sometimes this dissociation is not found early in the disease. Lymphocytic choriomeningitis and mumps meningitis have been adequately discussed by Dr. Sayers. Note that some importance is attached to a positive colloidal gold test (midzone) in mumps meningitis. In the purulent meningitides, the increase in polymorphonuclear cells, the elevated protein content, the decrease in values for sugar and sometimes, chlorides, as well as the smear and culture—all these items together make the diagnosis. I'll pass over the remainder except to note that in cases of meningismus, whatever its etiology, the only positive finding may be an elevated cerebrospinal fluid pressure."

Dr. Wightman: "You can see from what Dr. Tracy said that certain interpretations from the cerebrospinal fluid are definite. On the other hand, there is quite a bit of overlap—it might be this or it might be that. We have had some of these cases here in recent years. We have had poliomyelitis, the Guillian-Barre syndrome, lymphocytic choriomeningitis, mumps meningitis, and a purulent meningitis. We haven't had any rabies.

"In view of the history, what is your opinion now, Dr. Rachun, of what this girl had? Can you be any more definite?"

Dr. Rachun: "Well, I don't think so. The features of aseptic meningitis that Dr. Sayers read off certainly are present. It was a very mild case. She had fever for only one day, and the cerebrospinal fluid findings aren't diagnostic.

"I think it's important to bear in mind that this would be the season for mumps, and not lymphocytic choriomeningitis. As I understand it, mice are the reservoir, they tend to leave the human abode in the spring, and the incidence of lymphocytic choriomeningitis goes down. As regards poliomyelitis, there was a statement in the article from which Dr. Sayers quoted to the effect that when there was a leukocytosis in the spinal fluid of over 500 cells, it was not very likely that a given illness was poliomyelitis.

"Getting back to a possible diagnosis, I cannot make one with any degree of certainty. However, one significant point in the history is that she never had mumps. Furthermore, she denied any contact with anybody with an infectious disease, particularly mumps, during her vacation three weeks before."

Dr. Little: "Did she have no previous history of mumps?"

Dr. Rachun: "That's right. It would be interesting to watch what the agglutination tests, etc., will show on her sera which we will send to the New York State Laboratory. Mumps meningitis is my best bet."

Dr. Wightman: "Do you think a person can have mumps meningitis without evidence of parotitis?"

Dr. Sayers: "About 45 per cent of the cases have meningitis alone. The rest are divided between meningitis with parotitis, meningitis with orchitis, and meningitis with both of them. This girl had no signs of parotitis. I think if I were to put my hand on one thing, despite the season incidence, which I agree is very much in favor of mumps meningitis, I would be more inclined to regard this case as one of lymphocytic choriomeningitis than as mumps, because I think the laboratory findings point more to the former. It seems to me that both the protein values and the cell counts are a little too high for mumps, and of course we have no other signs of mumps."

Dr. Alexander: "Is the incubation period of lymphocytic choriomeningitis known?"

Dr. Sayers: "I don't know."

Dr. Rachun: "Dr. Sayers, I think we have room for argument on the diagnostic importance of the cerebrospinal fluid findings, in this case. For instance, we know that in mumps meningitis the white cell count can go up to 1,200, and in lymphocytic choriomeningitis it may rise to 6,000. In our case it was about 800. The overlap is so great, I don't think you can be guided by it particularly.

"Doesn't lymphocytic choriomeningitis occur under conditions of poor housing, where mice are more likely to be found?"

Dr. Alexander: "Certainly I think there is evidence that it is tied up with the mouse population, and that bears some relation to housing facilities. In modern buildings of steel and concrete there are less harboring facilities for mice than in wooden houses. So I think there would be a socio-economic relationship."

Dr. Darsie: "What is the method of transmission?"

Dr. Tracy: "It is a contamination by the excretions of an infected mouse."

Dr. Rachun: "Does anbody think this disease was herpes or leptospirosis?"

Dr. Alexander: "I think I might be in favor of the lymphocytic

choriomeningitis because of the mildness of the illness. It is said to be, on the whole, milder than the others mentioned."

Dr. Sayers: "Have we any convalescent serum?"

Dr. Rachun: "We are going to get that shortly."

Dr. Sayers: "Dr. Ferris said we ought to have a blood specimen one to two weeks after the onset and another six weeks after the onset—none during the acute stage. This is for lymphocytic choriomeningitis."

Dr. Wightman: "There are one or two things that occur to me. We have had occasion to do spinal puncture on a case of virus pneumonia that had a stiff neck and we have had one case of infectious mononucleosis that had a stiff neck, all of which goes to prove that these viral infections, or supposedly viral infections, create a meningeal response at times. Meningismus is also found with virus pneumonias at times."

Dr. Alexander: "What is the usual blood picture in cases of aseptic meningitis? I notice this girl had quite a marked leukocytosis."

Dr. Sayers: "They said nothing about it at all."

Dr. Alexander: "I was surprised to find so high a count with either a mumps meningitis or lymphocytic choriomeningitis."

Dr. Sayers: "They mentioned blood counts only when they quoted cases of each disorder, and these counts were substantially normal."

Dr. Wightman: "It certainly makes one realize that a great deal of work and clarification needs to be done in these various entities which overlap so commonly, and we will await with interest the results of serum antibody studies which may or may not help us. Statistically we have a 30-per-cent chance of getting a diagnosis and a 70 per cent chance of not getting a diagnosis. For most of these illnesses, little can be done except symptomatic treatment, and the prognosis is good. In cases such as meningeal involvement due to bacteria, however, specific treatment can be given to the patient. That is why we lost no time in examining this girl's cerebrospinal fluid.

"Does anybody else have any comments? Did you see much of this in the service Dr. Haringa?"

Dr. Haringa: "I recall one case of aseptic meningitis, and the Army Medical Center did all sorts of tests. They found no specific cause for it."

Addendum: Blood specimens from the patient were sent to the

New York State Department of Health laboratories at Albany on May 5, 1954, May 24, 1954, and June 16, 1954. Tests were conducted for St. Louis encephalitis, mumps virus antigen and lymphocytic choriomeningitis. The results of these tests were negative.

One Year's Experience with Psychosis

Dr. Darling: "We have gone through the records in the Mental Health Division for the last twelve months and examined all the cases of psychosis. Very likely it is a fair representation of the psychoses occurring on campus. There are some cases of psychosis, undoubtedly, who never are seen by us but they are few and far between. These ten cases have been under our care and I thought I would talk about them briefly, taking them in the order of their occurrence (see Table 1).

"The first patient, patient 'A,' you know about because we presented him in this conference a year ago. His diagnosis was schizophrenia; he was given a medical leave of absence in December 1953, and he went home after a period of stalling and resistance on the part of his family and himself. At home he was admitted to a hospital, where he received electric-convulsive therapy. Early this summer he called me and wanted to return to college, but I could tell by the way he sounded on the phone that he wasn't at all well. He continued in therapy with the doctor in this hospital, and toward the end of the summer of 1954 the doctor wrote a letter saying, whereas the patient wasn't entirely well, he thought he was well enough to come back to Cornell. The patient was interviewed by us this fall and we found that he was very much better. He certainly was not entirely well; however, he seemed well enough to be able to adjust to college life. Because he needed only one more year to finish college and because his family was co-operative, we felt we owed him the chance to come back. Consequently, we allowed him to do so. This fall he has been doing his work quite well and not bothering anybody. He is adjusting fairly well. We receive regular reports about him, but we do not see him because of his antagonism to further treatment.

"Patient 'B' was a case of an acute catatonic schizophrenia. He

appeared normal to his roommate and friends up to two days before he came to my office. He practically burst into my office in a state of tension and excitement. He was not disoriented, however, and he was co-operative after getting acquainted. After he was reassured, he agreed to go to the Infirmary. He was there for two days before his father came for him. During this time he became more excited, confused, and delusional.

"This man was hospitalized in a private hospital in B——. I don't know what treatment he obtained, neither do I know what his state is now. This is a person with a psychosis who did not return to Cornell. It is of interest that this boy's mother has been ill in a mental hospital for over twenty years.

"Patient 'C' came to our attention early in her freshman year because of peculiar eating habits and her withdrawn, depressed, and seclusive behavior. Also, she was suspected of some stealing. I tried to work with her in the office, using psychotherapy, but these cases are traditionally difficult. After five or six hours she withdrew from treatment, felt we did not help her and said that she did not have confidence in us. Nothing further was done for her except that we kept track of her through the chaperon and through the student vice-president on the corridor. Finally her behavior became more and more odd. She was keeping a rat in her room as a pet. At one point she stuck her hand through a window in a state of undue anger. Consequently we had to ask her family to come. At a conference attended by Dean Brooks, Miss McCormick (Health Counselor), and myself, the parents asked our advice. We advised hospitalization in the X—— Clinic. They felt this was a good idea and took her home and she is now in the X—— Clinic. She has been there ever since she left Cornell, and they report that her progress is extremely slow. Last September I talked with her doctor and they were going to use modified insulin therapy. I don't know the result of this treatment. She has not returned to Cornell.

"Patient 'D' was a freshman last year. Before coming to Cornell, he had been under the care of a psychiatrist in R—— after having to withdraw from another college the previous year. Early in his first term here he showed symptoms of a borderline condition. At times he would become unduly anxious, indecisive, and hostile. He is a brilliant boy, and he was co-operative. It was decided (after confer-

ring with his family and his physician) that although there was some risk involved we would try to keep him in college. He was seen every week or two by Miss McCormick, with occasional short interviews by me. With this supportive therapy he was able to get along. However, in March he came to my office in an extreme state of excitement, had delusional ideas, and was un-co-operative. I brought him down to the Infirmary. I tried for an hour to get him to take a sedative, but I finally had to say that if he didn't take the sedative I would have him held and give it to him intravenously. He finally co-operated after more persuasion. After a day or two he went home with his parents. He did not go to a hospital, but he had psychotherapy from his doctor in R——. For the first time, the doctor tells me, the patient himself felt he did need treatment and so remained in therapy for several months. He has made an excellent recovery. He had a definite schizophrenia when he left. Now we would not consider him borderline, but would consider him recovered. His adjustment at Cornell this fall is good. His fraternity initiation caused him some anxiety, but this was temporary. He was a case of schizophrenia who recovered and now is doing excellent work without any support from us at all.

"Patient 'E' is a boy who was picked up by the police because he had been peeping in a window and stealing undergarments from girls' rooms. He was turned over to us by the University Proctor and the Ithaca police. The police had to shoot at him to make him stop running the night he was discovered in the act of peeping. He was admitted to the Infirmary for observation. He had definite schizophrenia. His family came, and I recommended that he have a consultation with the state hospital near his home. He had this consultation, but whether or not he was admitted I do not know. He has not asked to return to Cornell, and if he did ask I doubt very much that we could give him permission.

"Patient 'F,' a freshman last year, came to our attention for the first time in the spring during his second term. His friends reported that his behavior was odd. He lay down and slept in front of Olin Hall and had been heard to be threatening suicide. He was brought to the Infirmary by the University Proctor. He had made one suicide attempt with Nembutal, had written two suicidal notes, and had tried to run away. In the Infirmary he was disturbed and depressed.

He was definitely suicidal, and it was my feeling that his attempt at suicide was genuine. In his relationship with me he was argumentative, caustic, demanding, and flamboyant. He absolutely refused to leave the University or to have any treatment anywhere or to admit that he was ill. His family was asked to come to Cornell. They could see that he was ill and helped to handle the patient. He, too, was admitted to the X—— Clinic, where he stayed for three weeks. He was discharged against advice and started ambulatory intensive psychotherapy. The father was not too co-operative, but the patient appeared to get along fairly well. He contacted me before the end of the term wanting to come back at once, but I said I would see him in early July. I found at that time that he had made excellent progress in his therapy. He had lost his suicidal impulses. He stated that he wanted to continue treatment with his psychiatrist, but he said he would have to quit because his father would not pay for it. To give this boy backing I told him his return to Cornell in the fall would be contingent upon continuing his therapy. He was grateful for my help and continued his therapy. He has come back to school apparently well adjusted and well motivated. I have seen him twice this fall and he seems to be adjusting very well indeed.

"Patient 'G' was a sophomore who became depressed in May, 1954. His diagnosis was depression with schizoid features, but primarily this was depression. He was suicidal. He finally gave us good cooperation, but for several days he denied illness and felt that he really did not need psychiatric treatment. He felt he *could not* go home and disgrace himself and his family. Much time and energy were spent in helping him to accept his illness. After this was accomplished, we arranged for his admission in the Z—— Psychiatric Clinic where he stayed for three weeks. He was seen for aftercare at the Y—— Clinic. This fall he applied for readmission to Cornell. From my interview with him I could see that he was no longer depressed, and whereas he still had some unresolved problems relative to his family, his career, and his social life, he had made much progress. Further follow-up shows that he is doing his work. He appears happy and his adjustment is excellent.[1]

[1] Since this conference this patient (patient "G") came to us and asked our help in obtaining further therapy. When we offered our services he was pleased and grateful and has been seen weekly for several weeks. Adjustment has continued at higher levels so that now he is no longer in active psychotherapy.

"Patient 'H' and the one just presented (patient 'G') were in the Infirmary at the same time; both were depressed. When this patient walked into my office before going to the Infirmary, he said, "I'm walking around like a dead man." I felt sure that he had a depression, but also I felt that there were schizoid symptoms in the picture. He appeared very sloppy, questioned whether he should be in college, was failing his work, felt deserted by everyone except one girl friend. In the Infirmary he was much more comfortable but appeared aimless, inadequate, and superficial, as well as depressed. His family had tremendous difficulty in seeing this as an illness, but we finally got him home to C—— where we recommended that he go into the V—— Psychiatric Institute. I offered to help make the arrangements for this, but the family decided not to send him there. He spent the summer working, saw a psychiatrist about twice during the summer, came back, and wanted very much to re-enter school. He looked ever so much better. He had lost his sloppy appearance. He appeared to be better organized, appeared to understand his problems. There seemed to be no reason to deny him readmission, although I was skeptical that he would succeed. His adjustment this fall has been poor. He has been attending classes sporadically and has been found performing some bizarre behavior, like sleeping under other boys' beds, etc. He comes in to check with us, and he says that everything is fine. We are waiting until mid-term before we check up on his scholastic standing. His family has been informed of this situation, also his doctor. He is not depressed now.[2]

"Patient 'I' was first seen by us in January, 1953. She was a freshman at that time. She had an early schizophrenia with marked obsessive-compulsive features. She couldn't make up her mind, couldn't make decisions. She said she felt terrible, was frightened when alone, feared she was losing her mind. She was observed at the Infirmary for three or four days, but no treatment could dislodge her compulsiveness, her confusion, or her altered affect. Her family would not believe that she was ill. Finally, after three days of talking, trying to convince the father that she was ill, he agreed to take her home. I think it was her bizarre written material that convinced him.

[2] The second half of this first term has been quite different from the first half described above. There has been no more odd behavior, and his performance academically is average.

I recommended hospitalization. The recommendation was not followed. She was seen by a doctor at home for ambulatory treatment. He gave her ambulatory electro-convulsive therapy, but no psychotherapy whatever. She apparently made a good recovery, for she came back to school, completed last year successfully, and went to Europe this summer. But she returned this fall in the same condition in which she went home in January 1953. The family, however, both father and mother, were determined that she register this fall, 1954. The patient felt too sick to try college but she knew her family would not provide more treatment if she did not register as they wished. I thought there was no danger in letting her try. If things deteriorated to the point where she could not keep up her work, which I felt would come very soon, then her family would be forced to give her the proper treatment. This happened, and in about two weeks she was immobilized. She was unable to go to meals, to face people, to make even simple decisions before she came to see me. I had kept close track of her by seeing her twice a week in the office as well as by contacting the house mother. I expected to have a hard time with her family, but instead they gave me complete co-operation and said, 'You have proved that she cannot go to school. We accept this, now what shall we do?' Again I recommended hospitalization, and they said, 'Where?' I suggested the X—— Clinic, and she is there now having treatment. I think that if she gets the proper treatment in psychotherapy she ought to recover in a year or so and may be able to come back and finish school.[3]

"The last case is patient 'J,' who re-entered Cornell this fall after being out of college two years attending a professional school. When she left she was in good health and good standing. Hence, no medical clearance was needed for readmission. Within a matter of days it was reported to the Dean of Women and to us that she was acting strangely, saying inappropriate things to her professors, and being far too affectionate and naïve in her social relationships. She was in the manic phase of manic-depressive psychosis. She had been in the X—— Clinic for four months last year. She was under psychotherapy during the summer, and her physician felt she was ready to come

[3] This patient has received excellent treatment in the hospital (psychotherapy plus serpesil) for the past four months. She is not completely well, but she is greatly improved and wants to return and complete the term and a half needed to get her degree. She has reregistered this term to accomplish this.

Table 1. Summary of one year's experience with psychosis among 9,600 students at Cornell University.

Patient	*Sex*	*Diagnosis*	*Date student left Cornell*	*Hospitalized?*	*Treatment*	*Date returned to Cornell*	*Present adjustment*
"A"	M	Schizophrenia	Dec. 1953	Yes	ECT plus psychotherapy	Sept. 1954	Fair
"B"	M	Schizophrenia	Feb. 1954	Yes	Not known	....	Not known
"C"	F	Anorexia nervosa	Mar. 1954	Yes	Modified insulin	....	Not known
"D"	M	Borderline schizophrenia	Mar. 1954	No	Psychotherapy	Sept. 1954	Good
"E"	M	Schizophrenia	Apr. 1954	Not known	Not known	....	Not known
"F"	M	Schizophrenia	Apr. 1954	Yes	Psychotherapy	Sept. 1954	Good
"G"	M	Depression	May 1954	Yes	Psychotherapy	Sept. 1954	Good
"H"	M	Schizophrenia with depression	May 1954	No	None	Sept. 1954	Fair
"I"	F	Schizophrenia	Oct. 1954*	Yes	Psychotherapy	....	Not known†
"J"	F	Manic psychosis	Oct. 1954	Not known‡	Not known	....	Not known

* Patient also had medical leave of absence in 1953 and received ambulatory ECT (electro-convulsive therapy) at that time.
† Patient has returned to Cornell since this case conference (see text).
‡ Patient had been hospitalized in 1953 with depression.

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back to school this fall. At the time this decision was made she must have been much better than she was when she arrived at Cornell, because her behavior deteriorated rapidly. She was antagonistic to help. She was meeting a different boy every night. She was not studying. I had to call her doctor in A—— and explain this situation. The patient visited her doctor, and her doctor sent her back to college. I learned of this when I was visiting in —— and so was able to talk to the doctor. She had picked up a lover over the weekend, and I guess this finally convinced the doctor in A—— that the patient was out of control. Many city doctors feel that Cornell is a fine place for patients to seek rehabilitation. We have trouble along this line fairly frequently.

"Those are the ten cases of psychoses which occurred in the past year. You'll see that 50 per cent have returned so far and that three of these are making good adjustments. Two are making fair adjustments. Every person who is given a medical leave of absence for a psychosis is required to have our permission for return, and usually I insist on an interview. In some cases, for instance in the case of patient 'F,' I did not insist on an interview because I had a three-page letter from his doctor covering the entire history.

"These cases bring up the question of granting leaves of absence by the Mental Health Division. It involves the question of readmission. This is more for the protection of the patient than for anything else. Occasionally a negative decision must be made because of frank and overt illness. The University administration has always given support in such cases. However, it is really difficult to keep somebody out if he wants to come back.

"A twelve-month experience with psychosis has been presented. It can be seen that diagnosis is the easiest aspect of management in these cases. Working with families, arranging for treatment, disposition, readmission, and follow-up are all special problems."

‡ Patient had been hospitalized in 1953 with depression.

Letter to the Editor

To the Editor:

Please advise me as to the current treatment of the common cold also any preventative measures which may be taken to prevent an epidemic here at the College, of any of the respiratory diseases. Influenza could be used as a classic example of the type of disease which is included under the general heading of the respiratory diseases.

MORGAN W. BROWN, M.D.
Director of Student Health
Alabama Polytechnic Institute
Auburn, Alabama

Your request for advice in regard to the treatment of the common cold and the prevention of epidemics of respiratory diseases constitutes a big order. Probably there is more conjecture and theory and less knowledge of the etiology and rational treatment of the symptom complex often referred to as A.R.D. (acute respiratory disease) than is the case of any other fairly common disease. Some recent work gives promise that this state may be changing in regard to etiology, if not in regard to treatment.

There has not yet been developed any specific curative treatment for the common cold. The most important thing, then, is follow the frequently repeated and frequently ignored advice to the physician "to do no harm." Investigators have reported that in 90 per cent or more of acute upper respiratory infections they have been unable to isolate a specific etiological agent. It is believed that a virus or viruses cause this major number of "colds" and similar infections. Therefore antibiotics are valueless in their treatment and only provide the possibility for reaction to the antibiotic.

Other drugs may be prescribed for what relief of symptoms they

can afford. Since the symptoms often vary from individual to individual and also in the individual in different epidemic periods, it is pointless to attempt to give a routine applicable to all cases. Therapy must be modified to fit the needs of the individual patient. In fact, any prescribed treatment is likely to be adapted by the patient to fit his own ideas based on his previous experiences or the advice of friends.

Prevention of the common cold by vaccine is not now possible and the development of an effective vaccine does not appear imminent. The recent isolation of six types of adenoidal-pharyngeal-conjunctival viral agents capable of producing acute respiratory tract disease, together with evidence that other types remain to be isolated, further complicates the problem. Immunity, if it is produced by naturally acquired infection, seems to be of short duration, so a vaccine would not only have to contain multiple antigenic agents but also it would have to be given at frequent intervals to maintain immunity. A practical vaccine for the prevention of the common cold does not appear likely of development.

Preventing or minimizing epidemic outbreaks of acute respiratory diseases by measures such as dust control, the use of ultra-violet irradiation, or propylene glycol vapor, is not possible. During World War II such measures were tried in military installations, and while there was noted some decrease in the incidence of respiratory diseases in nonepidemic periods there was no effect during epidemic periods.

The status of vaccination against influenza is more hopeful. In an article in the January 15, 1955, issue of *Modern Medicine,* Dr. Werner Henle observes that under optimal conditions the incidence of influenza B can be reduced by 90 to 95 per cent. With influenza A results are not so good. He also states that the multiplicity of agents causing influenzalike disease, as well as the antigenic variability among the individual types of influenza virus, has so far prevented the development of wholly satisfactory preventive measures. Other drawbacks are: the fact that a period of a week or more is needed for any immunity to develop, that a high degree of immunity is maintained for only a short period, and that the vaccine is prepared from infected chick embryo materials and therefore cannot safely be given to individuals allergic to egg or chicken proteins. In a relatively closed population group, such as a school, vaccination must be carried out

before the first case develops, otherwise a large proportion may de
velop infection before vaccination has time to produce immunity
This, however, does not allow time to determine the infecting strai
to ensure that it is a constituent of the vaccine used. The vaccinatio
program will be fruitless if vaccine containing the prevalent antigeni
strain of influenza virus is not used. Further, none of the availabl
vaccines at present contain influenza C, because it has been hel
responsible for only minor local outbreaks.

From the foregoing it is apparent that a wholly satisfactory pro
gram for the prevention of influenza in a student body is yet to b
achieved.